

CLAIMS

1. A preform for a container comprised of orientable plastics material and arranged so that the resultant blown container will include a hollow handle; said preform comprising a moulded structure having a neck portion and an expandable portion below the neck, a hollow handle portion of orientable plastics material integrally connected at least at a first end to said preform which when the container is formed constitutes said handle, and wherein interior surfaces of said hollow handle portion form a continuum with interior surfaces of said expandable portion.
2. A method of moulding a preform comprising a neck portion, a substantially cylindrical expandable body portion and a hollow handle portion integrally connected at least at one point to said expandable body portion; said method comprising the steps of:
  - (a) preparing an injection moulding die in which the exterior form of said body portion and said handle portion of said preform are defined by a cavity formed by cooperating halves of said injection die,
  - (b) preparing a main body forming mandrel for insertion into said cavity; said mandrel

- 26 -

provided at an outer end with a control module,

(c) providing a passage extending from said control module substantially centrally through said mandrel; said passage curving to emerge at a side of said mandrel opposite said at least one point,

(d) providing a flexible handle mandrel controlled by said control module; said mandrel adapted for insertion through said passage and into said handle portion of said cavity.

3. The method of claim 2 wherein said flexible mandrel is an inflatable flexible tube of heat resistant material.
4. The method of claim 2 or 3 wherein said tube is sealed at an outer end.
5. The method of claim 4 wherein said outer end is provided with a solid tip projecting through said outer end.
6. The method of claim 5 wherein said tip is of substantially cylindrical form, said tip oriented with its axis substantially aligned with the axis of said tube.
7. The method of claim 5 or 6 wherein the diameter of said tip defines the diameter of the interior of the hollow handle when formed.

- 27 -

8. The method of any one of claims 3 to 7 wherein a cable extends through said tube from said control module to said tip.
9. The method of any one of claims 3 to 8 wherein said control module is adapted to extend and retract said tube.
10. The method of any one of claims 3 to 9 wherein said control module is adapted to inflate and deflate said tube.
11. The method of any one of claims 5 to 10 wherein said method for moulding a preform with a hollow handle attached at one point to said body comprises the further steps of:
  - (a) providing a first injection gate at an outer end of said handle portion of said cavity,
  - (b) inflating said tube so as to completely fill said handle portion of said cavity,
  - (c) injecting a flowable plastic material through said gate so as to envelop said tip,
  - (d) arranging said control module to partially deflate said tube,
  - (e) arranging said control module to gradually withdraw said tube from said handle portion of said cavity at a rate commensurate with the injection rate of said flowable material,
  - (f) injecting said flowable material through a second injection gate at an outer end of said

- 28 -

body portion of said cavity,

(g) continuing injection of flowable material through both gates until said tip bridges a gap between said handle portion and said main body forming mandrel,

(h) withdrawing said tube and said tip into said main body forming mandrel,

(i) continuing injection of flowable material to completely fill said cavity.

12. The method of any one of claims 5 to 10 wherein said method for moulding a preform with a hollow handle connected at two points to said body; said handle extending from a first connection point to a second connection point, said method comprises the further steps of:

(a) providing a pocket for nesting said tip in said main body mandrel opposite said second connection point,

(b) inserting said tube through said handle portion of said cavity to nest said tube in said pocket,

(c) inflating said tube,

(d) injecting flowable material through an injection gate at an outer end of said main body portion of said cavity,

(e) continuing said injection of flowable material until said material envelops said

- 29 -

tip,

- (f) gradually withdrawing said tube commensurate with a rate of injection of said flowable material so as to maintain said tip enveloped by said material,
- (g) pausing withdrawal of said tube when said tip bridges a gap between said handle portion and said main body forming mandrel at said first connection point,
- (h) withdrawing said tube and said tip into said main body forming mandrel,
- (i) continuing injection of flowable material to completely fill said cavity.

13. A method of forming a container of plastic material having an integral hollow handle; said method comprising:

- (a) forming a preform according to any one of claims 2 to 12, having a neck portion and an expandable portion below the neck portion, said preform having a hollow handle portion integrally connected at least at a first end to said preform, and
- (b) preheating said preform to condition said plastic material,
- (c) performing a blow moulding operation on said preform to expand the expandable portion and

- 30 -

said handle portion to form the body and handle of said container.

14. A container provided with a hollow handle, said handle integrally connected to at one point to said container, said container formed by stretch blow-moulding from a preform according to any one of claims 2 to 11, wherein an outer end of said handle is separated by a gap from said container.
15. A container provided with a hollow handle, said handle integrally connected at least at one point to said container, said container formed by stretch blow-moulding from a preform according to any one of claims 2 to 11, wherein an outer end of said handle is adapted for at least partial capture within a portion of a wall of said container when said container is stretch blow-moulded from said preform.
16. A container provided with a hollow handle, said handle integrally connected to said container at a first point and a second point so as to allow the insertion of the fingers of a hand of a user, said container formed by stretch blow-moulding from a preform according to claim 12.

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